General

Guideline Title

Pediatric eye evaluations: I. Vision screening in the primary care and community setting. II. Comprehensive ophthalmic examination.

Bibliographic Source(s)

American Academy of Ophthalmology Pediatric Ophthalmology/Strabismus Panel. Pediatric eye evaluations: I. Vision screening in the primary care and community setting. II. Comprehensive ophthalmic examination. San Francisco (CA): American Academy of Ophthalmology; 2012. 44 p. [170 references]

Guideline Status

This is the current release of the guideline.

This guideline updates a previous version: American Academy of Ophthalmology Pediatric Ophthalmology/Strabismus Panel. Pediatric eye evaluations: I. Screening; II. Comprehensive ophthalmic evaluation. San Francisco (CA): American Academy of Ophthalmology; 2007. 32 p.

All Preferred Practice Patterns are reviewed by their parent panel annually or earlier if developments warrant and updated accordingly. To ensure that all Preferred Practice Patterns are current, each is valid for 5 years from the "approved by" date unless superseded by a revision.

Recommendations

Major Recommendations

Note from the National Guideline Clearinghouse (NGC): A full description of the Care Process is provided in the original guideline document.

Ratings of the strength of the recommendations (Strong, Discretionary) and quality of evidence (Good, Moderate, Insufficient) are defined at the end of the "Major Recommendations" field.

Vision Screening in the Primary Care and Community Setting

Vision Screening and Referral Plan

Vision screening should be performed at an early age and at regular intervals throughout childhood (see the table below). The elements of vision screening vary depending on the age and level of cooperation of the child. *(Strong recommendation, Moderate evidence)*

Table. Age-Appropriate Methods for Pediatric Vision Screening and Criteria for Referral

Method	Indications for Referral	Recommended Age

Method	Indications for Referral	Recommended Age				
		Newborn–6 months	6 mos and until child is able to cooperate for subjective VA testing	3–4 yrs	4–5 yrs	Every 1–2 yrs after age 5 yrs
Red reflex test	Absent, white, dull, opacified, or asymmetric	X	X	X	X	X
External inspection	Structural abnormality (e.g., ptosis)	X	X	X	X	X
Pupillary examination	Irregular shape, unequal size, poor or unequal reaction to light	X	X	X	X	X
Fix and follow	Failure to fix and follow	Cooperative infant >3 mos	X			
Corneal light reflection	Asymmetric or displaced		X	X	X	X
Instrument-based screening*	Failure to meet screening criteria		X	X	X	X
Cover test	Refixation movement			X	X	X
Distance visual acuity† (monocular)	20/50 or worse in either eye			X	X	X
	20/40 or worse in either eye				X	X
	Worse than 3 of 5 optotypes on 20/30 line, or 2 lines of difference between the eyes					X

Note: These recommendations are based on panel consensus. If screening is inconclusive or unsatisfactory, the child should be retested within 6 months; if inconclusive on retesting or if retesting cannot be performed, referral for a comprehensive eye evaluation is indicated.

VA = visual acuity

*Subjective visual acuity testing is preferred to instrument-based screening in children who are able to participate reliably. Instrument-based screening is useful for young children and those with developmental delays.

†LEA Symbols (Good-Lite Co., Elgin, IL), HOTV, and Sloan Letters are preferred optotypes.

Comprehensive Ophthalmic Examination

Visual Acuity

The choice and arrangement of optotypes (letters, numbers, symbols) on an eye chart can significantly affect the visual acuity score obtained. Preferred optotypes are standardized and validated. *(Strong Recommendation, Good Evidence)*

Vision testing with single optotypes is likely to overestimate visual acuity in a patient with amblyopia. A more accurate assessment of monocular visual acuity is obtained with the presentation of a line of optotypes or a single optotype with crowding bars that surround (or crowd) the optotype being identified. *(Strong Recommendation, Good Evidence)*

Diagnosis and Management

Refractive correction should be prescribed for children according to the guidelines in the table below. *(Discretionary recommendation, Insufficient evidence)*

Table. Guidelines for Refractive Correction in Infants and Young Children

Condition	Refractive Errors (Diopters)		
	Age <1 Year	Age 1–2 Years	Age 2–3 Years
Isoametropia (similar refractive error in both eyes)			
Myopia	–5.00 or more	–4.00 or more	–3.00 or more
Hyperopia (no manifest deviation)	+6.00 or more	+5.00 or more	+4.50 or more
Hyperopia with esotropia	+2.50 or more	+2.00 or more	+1.50 or more
Astigmatism	3.00 or more	2.50 or more	2.00 or more
Anisometropia (without strabismus)*			
Myopia	–4.00 or more	–3.00 or more	–3.00 or more
Hyperopia	+2.50 or more	+2.00 or more	+1.50 or more
Astigmatism	2.50 or more	2.00 or more	2.00 or more

Note: These values were generated by consensus and are based solely on professional experience and clinical impressions because there are no scientifically rigorous published data for guidance. The exact values are unknown and may differ among age groups; they are presented as general guidelines that should be tailored to the individual child. Specific guidelines for older children are not provided because refractive correction is determined by the severity of the refractive error, visual acuity, and visual symptoms.

*Threshold for correction of anisometropia should be lower if the child has strabismus. The values represent the minimum difference in the magnitude of refractive error between eyes that would prompt refractive correction.

Definitions:

Strength of Recommendation

Strong recommendation - Used when the desirable effects of an intervention clearly outweigh the undesirable effects or clearly do not

Discretionary recommendation - Used when the trade-offs are less certain—either because of low-quality evidence or because evidence suggests that desirable and undesirable effects are closely balanced

Body of Evidence Quality Ratings

Good quality - Further research is very unlikely to change confidence in the estimate of effect.

Moderate quality - Further research is likely to have an important impact on confidence in the estimate of effect and may change the estimate.

Insufficient quality - Further research is very likely to have an important impact on confidence in the estimate of effect and is likely to change the estimate; any estimate of effect is very uncertain.

Clinical Algorithm(s)

None provided

Scope

Disease/Condition(s)

Childhood ocular conditions including:

- Congenital cataract

- Retinopathy of prematurity
- Congenital glaucoma
- Retinoblastoma
- Cerebral visual impairment
- Strabismus
- Amblyopia
- Refractive errors (myopia, hyperopia, astigmatism)
- Pediatric uveitis

Guideline Category

Evaluation

Screening

Clinical Specialty

Family Practice

Ophthalmology

Pediatrics

Intended Users

Advanced Practice Nurses

Health Plans

Nurses

Physicians

Guideline Objective(s)

Pediatric Eye Screening

To identify children who may have reduced visual acuity or risk factors that threaten the healthy growth and development of the eye and visual system while addressing the following goals:

- Educate screening personnel
- Assess vision, ocular alignment, and the presence of ocular structural abnormalities
- Communicate the screening results and follow-up plan to the family/caregiver
- Refer all children who either fail screening or who are unstable for a comprehensive eye examination
- Verify that the recommended comprehensive eye examination has occurred

Comprehensive Ophthalmic Evaluation

To evaluate abnormalities detected by screening, to identify risk factors for disease, to detect and diagnose sight- and life-threatening disease, to initiate a plan of treatment as necessary and to address the following goals:

- To identify risk factors for ocular disease
- To identify systemic disease based on associated ocular findings
- To identify factors that may predispose to visual loss early in a child's life
- To determine the health status of the eye and related structures, visual system, and assess refractive errors
- To discuss the nature of the findings of the examination and their implications with the parent/caregiver, primary care physician and, when

appropriate, the patient
- To initiate an appropriate management plan (e.g., treatment, counseling, further diagnostic tests, referral, follow-up, early intervention services*) for newborns to children up to age 3 years or individual education plan in the public school system for children older than 3 years)

*Under U.S. federal law, early intervention services for children of any age with visual impairments are available from public school districts and regional centers.

Target Population

Infants and children through age 18 years

Interventions and Practices Considered

Pediatric Eye Screening

1. History
2. Screening examination
    - Red reflex test
    - External inspection
    - Pupillary examination
    - Fix and follow
    - Corneal light reflection
    - Instrument-based screening
    - Cover test
    - Distance visual acuity (monocular)
3. Referral, if necessary

Comprehensive Pediatric Medical Eye Evaluation

1. History
2. Examination
    - Binocular red reflex (Brückner) test
    - Binocularity/stereoacuity testing
    - Assessment of fixation pattern and visual acuity
    - Binocular alignment and ocular motility
    - Pupillary examination
    - External examination
    - Anterior segment examination
    - Cycloplegic retinoscopy/refraction
    - Funduscopic examination
3. Treatment and management plan, including refractive correction
4. Follow-up evaluation
5. Referral to specialist

Major Outcomes Considered

- Quality of life
- Burden of eye disease

Methodology

Methods Used to Collect/Select the Evidence

Searches of Electronic Databases

Description of Methods Used to Collect/Select the Evidence

Literature searches to update the Preferred Practice Pattern were undertaken in April 2011 in PubMed and the Cochrane Library and updated in March 2012. Complete details of the literature search are available at the American Academy of Ophthalmology Web site .

Number of Source Documents

Not stated

Methods Used to Assess the Quality and Strength of the Evidence

Weighting According to a Rating Scheme (Scheme Given)

Rating Scheme for the Strength of the Evidence

Levels of Evidence to Rate Individual Studies

I++ High-quality meta-analyses, systematic reviews of randomized controlled trials (RCTs), or RCTs with a very low risk of bias

I+ Well-conducted meta-analyses, systematic reviews of RCTs, or RCTs with a low risk of bias

I- Meta-analyses, systematic reviews of RCTs, or RCTs with a high risk of bias

II++ High-quality systematic reviews of case-control or cohort studies

High-quality case-control or cohort studies with a very low risk of confounding or bias and a high probability that the relationship is causal

II+ Well-conducted case-control or cohort studies with a low risk of confounding or bias and a moderate probability that the relationship is causal

II- Case-control or cohort studies with a high risk of confounding or bias and a significant risk that the relationship is not causal

III Nonanalytic studies (e.g., case reports, case series)

Body of Evidence Quality Ratings*

Good quality - Further research is very unlikely to change confidence in the estimate of effect.

Moderate quality - Further research is likely to have an important impact on confidence in the estimate of effect and may change the estimate.

Insufficient quality - Further research is very likely to have an important impact on confidence in the estimate of effect and is likely to change the estimate; any estimate of effect is very uncertain.

*Defined by Grading of Recommendations Assessment, Development and Evaluation (GRADE)

Methods Used to Analyze the Evidence

Systematic Review

Description of the Methods Used to Analyze the Evidence

All studies used to form a recommendation for care are graded for strength of evidence individually, and that grade is listed with the study citation.

To rate individual studies, a scale based on Scottish Intercollegiate Guideline Network (SIGN) is used. The definitions and levels of evidence to rate individual studies are listed in the "Rating Scheme for the Strength of the Evidence" field.

Methods Used to Formulate the Recommendations

Expert Consensus

Description of Methods Used to Formulate the Recommendations

The Pediatric Ophthalmology/Strabismus Preferred Practice Pattern® Panel members wrote the Pediatric Eye Evaluations Preferred Practice Pattern® guidelines ("PPP"). The PPP Panel members discussed and reviewed successive drafts of the document, meeting in person twice and conducting other review by e-mail discussion, to develop a consensus over the final version of the document.

Rating Scheme for the Strength of the Recommendations

Key recommendations for care are defined by Grading of Recommendations Assessment, Development and Evaluation (GRADE) as follows:

Strong recommendation Used when the desirable effects of an intervention clearly outweigh the undesirable effects or clearly do not

Discretionary recommendation Used when the trade-offs are less certain—either because of low-quality evidence or because evidence suggests that desirable and undesirable effects are closely balanced

Cost Analysis

The guideline developers reviewed published cost analyses.

Method of Guideline Validation

External Peer Review

Internal Peer Review

Description of Method of Guideline Validation

The Preferred Practice Patterns Committee members reviewed and discussed the document during a meeting in March 2012. The document was edited in response to the discussion and comments.

The Pediatric Eye Evaluations Preferred Practice Pattern was then sent for review to additional internal and external groups and individuals in June 2012. All those returning comments were required to provide disclosure of relevant relationships with industry to have their comments considered. Members of the Pediatric Ophthalmology/Strabismus PPP Panel reviewed and discussed these comments and determined revisions to the document.

These guidelines were approved by the Board of Trustees of the American Academy of Ophthalmology (September 15, 2012).

Evidence Supporting the Recommendations

Type of Evidence Supporting the Recommendations

The type of supporting evidence is identified and graded for each recommendation (see the "Major Recommendations" field).

Benefits/Harms of Implementing the Guideline Recommendations

Potential Benefits

- The purpose of periodic eye and vision screening is to identify children who may have eye disorders, particularly those that contribute to the development of amblyopia, at a sufficiently early age to allow effective treatment. The earlier amblyopia is detected and properly treated, the higher the likelihood of visual acuity recovery. Mounting evidence indicates that successful treatment of visual disability sustains or improves quality of life.
- Children who have developmental delays, intellectual disabilities, neuropsychological conditions, and/or behavioral issues that render them untestable by other caregivers benefit greatly from a comprehensive eye examination by an ophthalmologist who is skilled in working with children.

Potential Harms

Short-term side effects of cycloplegic and dilating agents may include hypersensitivity reactions, fever, dry mouth, rapid pulse, nausea, vomiting, flushing, and, rarely, behavioral changes.

Qualifying Statements

Qualifying Statements

- Preferred Practice Patterns (PPPs) provide guidance for the pattern of practice, not for the care of a particular individual. While they should generally meet the needs of most patients, they cannot possibly best meet the needs of all patients. Adherence to these PPPs will not ensure a successful outcome in every situation. These practice patterns should not be deemed inclusive of all proper methods of care or exclusive of other methods of care reasonably directed at obtaining the best results. It may be necessary to approach different patients' needs in different ways. The physician must make the ultimate judgment about the propriety of the care of a particular patient in light of all of the circumstances presented by that patient. The American Academy of Ophthalmology is available to assist members in resolving ethical dilemmas that arise in the course of ophthalmic practice.
- Preferred Practice Pattern® guidelines are not medical standards to be adhered to in all individual situations. The Academy specifically disclaims any and all liability for injury or other damages of any kind, from negligence or otherwise, for any and all claims that may arise out of the use of any recommendations or other information contained herein.
- References to certain drugs, instruments, and other products are made for illustrative purposes only and are not intended to constitute an endorsement of such. Such material may include information on applications that are not considered community standard, that reflect indications not included in approved U.S. Food and Drug Administration (FDA) labeling, or that are approved for use only in restricted research settings. The FDA has stated that it is the responsibility of the physician to determine the FDA status of each drug or device he or she wishes to use, and to use them with appropriate patient consent in compliance with applicable law.

Implementation of the Guideline

Description of Implementation Strategy

An implementation strategy was not provided.

Implementation Tools

Chart Documentation/Checklists/Forms

For information about availability, see the *Availability of Companion Documents* and *Patient Resources* fields below.

Institute of Medicine (IOM) National Healthcare Quality Report Categories

IOM Care Need

Staying Healthy

IOM Domain

Effectiveness

Patient-centeredness

Identifying Information and Availability

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Adaptation

Not applicable: The guideline was not adapted from another source.

Date Released

1992 Jun (revised 2012)

Guideline Developer(s)

American Academy of Ophthalmology - Medical Specialty Society

Source(s) of Funding

Preferred Practice Pattern® guidelines are developed by the Academy's H. Dunbar Hoskins Jr., M.D. Center for Quality Eye Care without any external financial support. Authors and reviewers of the guidelines are volunteers and do not receive any financial compensation for their contributions to the documents.

Guideline Committee

Pediatric Ophthalmology/Strabismus Preferred Practice Pattern Panel; Preferred Practice Patterns Committee

Composition of Group That Authored the Guideline

Members of the Pediatric Ophthalmology/Strabismus Panel: C. Gail Summers, MD (*Chair*); Stephen P. Christiansen, MD; Alex R. Kemper,

MD, MPH, MS, American Academy of Pediatrics Representative; Katherine A. Lee, MD, PhD; Graham E. Quinn, MD; Michael X. Repka, MD, MBA; David K. Wallace, MD, MPH, American Association for Pediatric Ophthalmology & Strabismus Representative; Susannah G. Rowe, MD, MPH, Methodologist

Members of the Preferred Practice Patterns Committee: Christopher J. Rapuano, MD (*Chair*); David F. Chang, MD; Robert S. Feder, MD; Stephen D. McLeod, MD; Timothy W. Olsen, MD; Bruce E. Prum, Jr., MD; C. Gail Summers, MD; David C. Musch, PhD, MPH, Methodologist

Financial Disclosures/Conflicts of Interest

In compliance with the Council of Medical Specialty Societies' Code for Interactions with Companies (available at www.cmss.org/codeforinteractions.aspx), relevant relationships with industry are listed. The Academy has Relationship with Industry Procedures to comply with the Code (available at http://one.aao.org/CE/PracticeGuidelines/PPP.aspx). A majority (87%) of the members of the Pediatric Ophthalmology/Strabismus Preferred Practice Pattern Panel 2011–2012 had no financial relationship to disclose.

Pediatric Ophthalmology/Strabismus Preferred Practice Pattern Panel 2011–2012

Stephen P. Christiansen, MD: No financial relationships to disclose
Alex R. Kemper, MD, MPH, MS: No financial relationships to disclose
Katherine A. Lee, MD, PhD: No financial relationships to disclose
Graham E. Quinn, MD: No financial relationships to disclose
Michael X. Repka, MD, MBA: No financial relationships to disclose
Susannah G. Rowe, MD: No financial relationships to disclose
C. Gail Summers, MD: No financial relationships to disclose
David K. Wallace, MD, MPH: Allergan, Inc. – Consultant/Advisor

Preferred Practice Patterns Committee 2012

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The disclosures of relevant relationships to industry of other reviewers of the document from January to August 2012 are available online at www.aao.org/ppp .

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Guideline Availability

Electronic copies: Available from the American Academy of Ophthalmology (AAO) Web site .

Print copies: Available from American Academy of Ophthalmology, P.O. Box 7424, San Francisco, CA 94120-7424; telephone, (415) 561-8540.

Availability of Companion Documents

The appendices of the original guideline document contain visual acuity testing charts.

Patient Resources

None available

NGC Status

This summary was completed by ECRI on June 30, 1998. The information was verified by the guideline developer on December 1, 1998. This summary was updated on March 12, 2003. The updated information was verified by the guideline developer on April 2, 2003. This NGC summary was updated by ECRI Institute on February 6, 2008. The updated information was verified by the guideline developer on February 27, 2008. This summary was updated by ECRI Institute on February 21, 2012.

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